Ph.D. Registration Research Proposal

On

“Traumatic Brain Injury Assessment Using Image Analysis Techniques”

For The Doctoral Degree

In

Instrumentation Engineering

By

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Presented to

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Traumatic Brain Injury Assessment Using Image Analysis Techniques

Introduction

Traumatic brain injury is a growing public health problem in the world. It annually affects millions of people in the world. Traumatic brain injury is usually caused by a relatively mild blow to the brain that causes just enough physical injury to possibly compromise the normal brain function of memory, attention, mental organization and logical thinking may be compromised. There are many short term and long term symptoms associated with traumatic brain injury including loss of memory loss of reasoning, neuropsychiatric alterations including decrements in social interactions. Fifty percent of the people who die do so within first two hours of injury.

One of the biggest challenges in addressing neuropsychological functioning and recovery is diagnosing itself.

When brain is injured, swelling occurs in many cases and fluid builds up inside the skull. Since brain is a closed system and there is no space for swollen tissues to expand and no adjoining tissues to absorb the fluid this is considered a very serious condition.

Currently neurological injuries are evaluated using the Glagow Coma scale(GCS) which evaluate s a patients consciousness level through his/her ability to respond to motor, verbal and visual stimuli. Other qualitative factors are used to assess the effect of traumatic brain injury, including loss of consciousness, alteration in mental status, focal neurological deficits and visual assessment.However, visual assessment of neuroimaging studies is subject to poor inter-raterreliabilityand may not be sensitive to detect mild injuries. Computer tomography imaging is faster and less costly. But Magnetic resonance imaging is still gold standard for initial traumatic brain injury analysis.

Proposed Work:

If GCS abnormalities are observed, computer tomography (CT) or MR imaging is used, depending on severity of presumed injury.

The goal of this work is to develop image analysis algorithm to investigate severity of traumatic brain injury. Wavelet analysis is a one of the very powerful tool in signal and image processing. A wavelet transform is an integral transform in which the kernel is a function (wavelet) that has

compact support, indicating that the function is non-zero over a finite interval and zero elsewhere. Due to this feature, wavelet analysis can identify local characteristics of a random field. The method comes in two versions: Continuous Wavelet Transform (CWT), where all values of translation and dilation (scale) parameters are considered, and Discrete Wavelet Transform (DWT), where only a discrete set of parameters is used. Recently, wavelet packets (WPs) have been widely used by many researchers to analyse biomedical signals and images. There are many outstanding properties of wavelet packets, which encourage researchers to employ them in widespread fields. It has been shown that sparsity of coefficients‟ matrix, computational efficiency and time-frequency analysis can be useful in dealing with many engineering problems. Another techniques are also available for image analysis.

It proposed to implement image analysis technique for the assessment of traumatic brain injury.

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